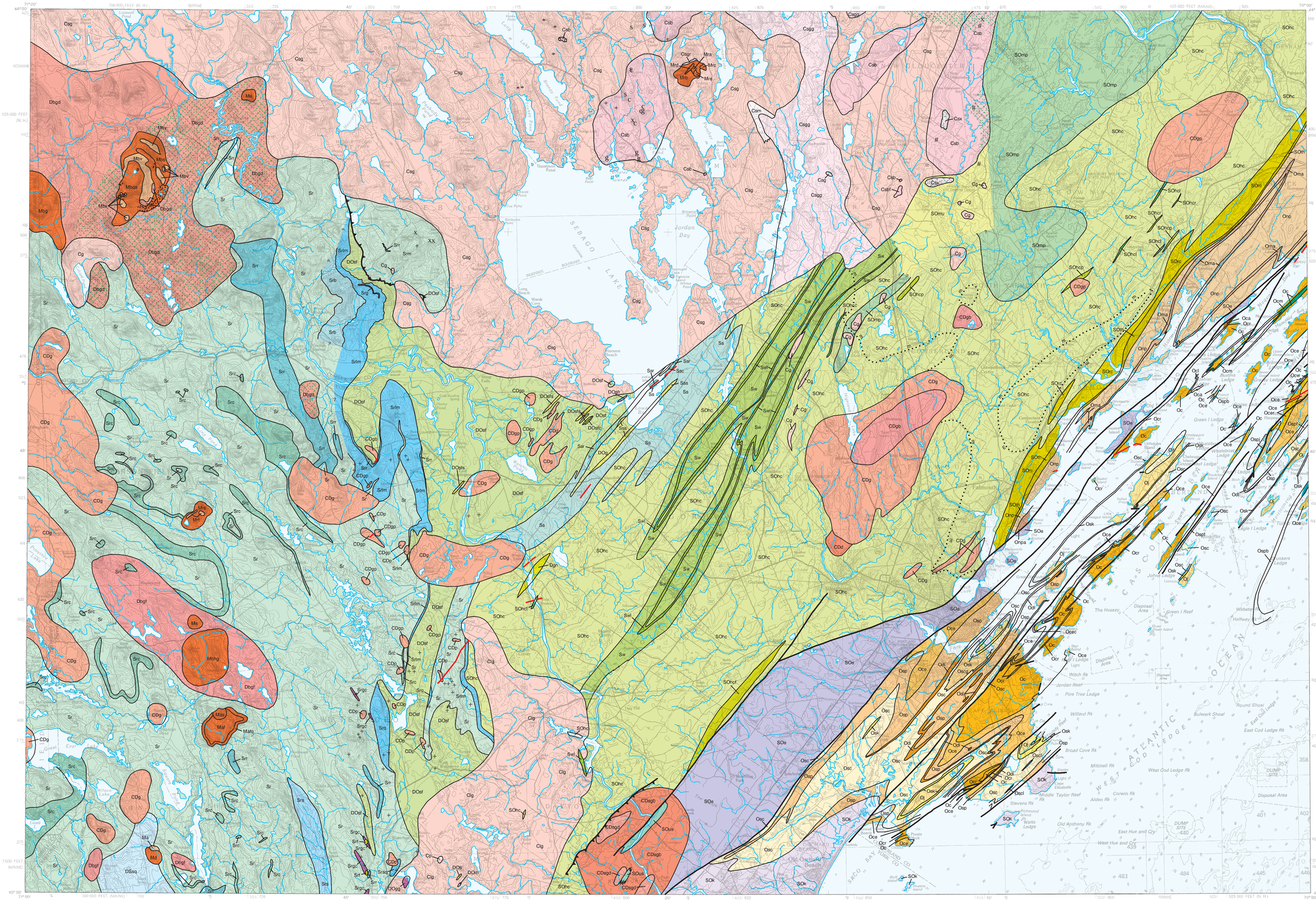
# Bedrock Geology of the Portland 1:100,000 Quadrangle, Maine and New Hampshire




Topographic base from U.S. Geological Survey Portland, Maine - New Hampshire 1:100,000-scale metric topographic-bathymetric map

Miles (mi) 0 1 2 3 4 5 6 7 8 9 10 11 12

Map Scale 1:100,000

Kilometers (km) 0 2 4 6 8 10 12 14 16 18 20

Contour interval 10 meters.
National geodetic vertical datum of 1929.
Elevations shown to nearest meter.

## INTRUSIVE AND RELATED VOLCANIC ROCKS

### MESOZOIC

**Randall Mountain Stock**

- Mrt — Fragmental trachyte porphyry.
- Mrs — Equigranular to porphyritic biotite-hornblende alkali feldspar syenite.

**Burnt Meadow Mountains Igneous Complex**

- Mbv — Volcanic breccia and feldspar porphyry. May include shallow intrusive rocks.
- Mbs — Alkali feldspar syenite. Brown to gray.
- Mbqs — Quartz syenite. Pinkish-tan.

**Acton Stock**

- Ma — Dark gray, porphyritic and fragmental andesite.
- Md — Medium-grained pyroxene-quartz diorite.

**Rattlesnake Mountain Igneous Complex**

- Mrc — Nepheline syenite.
- Mrd — Nepheline-bearing syenite.
- Mrc — Fine-grained syenite.
- Mrb — Ferrohastingsite syenite.
- Mra — Biotite-ferrohastingsite syenite.

**Abbott Mountain Stock**

- Mas — Light colored syenite.
- Maf — Fayalite-pyroxene syenite.
- Mafq — Fayalite-pyroxene-quartz syenite.

**Other Rocks of the White Mountain Magma Series**

- Ms — Fayalite-pyroxene syenite (at Symmes Pond, Boston Hills).
- Mbhg — Medium-grained biotite-hornblende granite (at Picket Mountain).
- Mbg — Pink, biotite granite. Locally with fine-grained or porphyritic texture (equivalent to the Conway Granite, New Hampshire).

### CARBONIFEROUS

**Sebago Pluton**

- Csg — Muscovite-biotite granite.
- Csb — Biotite granite, non-foliated
- Csbf — Biotite granite, foliated.
- Csgg — Muscovite-garnet granite.
- Csx — Mixed muscovite-garnet and muscovite-biotite granites.
- Csm — Migmatitic muscovite-biotite granite.
- Csgr — Riebeckite-bearing granite (near Rattlesnake Mountain).

### CARBONIFEROUS(?)

**Lyman Pluton**

- Clg — Biotite-muscovite granite and pegmatite.

**Other Plutonic Rocks**

- Cg — Granites, mainly muscovite-bearing.
- Cp — Pegmatite, commonly with muscovite, garnet, and black tourmaline.

### CARBONIFEROUS(?) OR DEVONIAN(?)

**Saco Pluton**

- CDsgb — Dark greenish-gray metamorphosed gabbro.
- CDsgd — Hornblende-biotite granodiorite.

**Other Plutonic Rocks**

- CDg — Granites, mainly muscovite-bearing.
- CDgb — Biotite granite.
- CDp — Pegmatite, commonly with muscovite, garnet, and black tourmaline.
- CDgp — Mixed granite and pegmatite.
- CDd — Dark greenish-gray diorite and gabbro.

### DEVONIAN(?)

- Dgn — Gray gneiss: Foliated biotite-hornblende granodiorite.
- Dbgf — Foliated or lineated biotite granite.
- Dbgd — Gray biotite granodiorite.

## STRATIFIED ROCKS

**Shapleigh Group**

- DSsq — Unnamed silvery gray, well bedded sillimanite-garnet-mica schist and quartzite (near Acton).
- Sr — Rindgemere Formation, undifferentiated: Reddish-brown to gray-weathering feldspathic sillimanite-garnet-mica schist and migmatite are most common. Various other types of schist and granofels occur also.
  - Srr — Rusty-weathering schist.
  - Srlm — Libby Mountain member: Silvery gray, thin-bedded to medium-bedded sillimanite-garnet-mica schist and quartzite.
  - Srq — Thick-bedded, white quartzite and subordinate quartz-mica schist.
  - Srsq — Thin-bedded sillimanite-garnet-mica schist and quartzite.
  - Srs — Poorly to moderately well bedded, silvery gray, mica schist and quartzite (near North Alfred).
  - Srb — Brown-weathering, feldspathic biotite schist.
  - Srf — Muscovite-biotite-feldspar gneiss.
  - Srg — Quartz-feldspar-biotite-garnet granofels.
  - Src — Interlayered calc-silicate granofels and granular biotite-quartz-feldspar schist. Calcic garnet (grossularite) and vesuvianite are present in some places.
  - Srgc — Quartz-feldspar-biotite-garnet granofels with interlayered calc-silicate granofels.
  - Srm — Coarse-grained, migmatitic muscovite-biotite-feldspar schist.

**Sebago Lake Sequence**

- DOsf — Steep Falls Formation: Quartz-feldspar-biotite granofels interlayered with variable proportions of diopside calc-silicate granofels and thin muscovite schist layers.
  - DOsfs — Light gray, muscovite-rich schist and granofels.
  - DOsfr — Rusty weathering feldspathic schist and dark gray granofels.
  - DOsfc — Pale green calc-silicate granofels.
- DOg — Unnamed biotite-quartz-feldspar granofels with calc-silicate layers.
- Ss — Standish Formation, undifferentiated: Massive to well layered, gray to rusty-weathering, sillimanite-garnet-mica schist interlayered with feldspathic granofels.
  - Ssr — Rusty-weathering sillimanite-bearing schist, locally migmatitic.
  - Sss — Silvery-gray muscovite-rich schist.
  - Ssc — Thinly laminated calc-silicate and biotite-quartz-feldspar granofels.

**Central Maine Sequence**

- SOmp — Unnamed migmatitic muscovite-bearing schist.
- SOmu — Undifferentiated migmatitic schist, gneiss, and granofels.
- SOus — Unnamed massive, brown-weathering, carbonate-rich schist and minor feldspathic granofels.
- Sw — Windham Formation: Massive to thinly bedded biotite-muscovite-garnet-quartz schist. Contains staurolite, kyanite, or sillimanite at appropriate metamorphic grade.
  - Swl — Limestone member: Laminated to thinly layered impure marble, calc-silicate granofels and minor quartzite.
- SOhc — Hutchins Corner Formation: Flaggy, bluish to purplish-gray, biotite-quartz-plagioclase granofels with thin interbeds of greenish-gray calc-silicate granofels. Where migmatitic, pegmatite layers commonly conform to bedding. May contain minor pelitic schist layers, but not generally in mappable amounts.
  - SOhcl — Impure marble and calc-silicate rock.
  - SOhcp — Pelitic schist, gray weathering.
  - SOhcr — Rusty-weathering schist.
  - SOhcf — Chalky-weathering, calcareous feldspathic gneiss and granofels. May be metamorphosed volcanic unit.
  - SOhcc — Diopside-plagioclase calc-silicate granofels.
- SOrc — Richmond Corner Formation: Garnetiferous quartz-plagioclase-biotite granular schist with minor amphibolite and garnet-quartz-magnetite granofels.
- SOth — Torrey Hill Formation: Extremely rusty weathering, sulfidic, graphitic schist.

**Units Isolated within the Lyman Pluton**

- DOm — Unnamed migmatitic schist.
- DOs — Unnamed garnet-mica schist.
- DOgg — Unnamed garnet granofels and granular schist.

**Falmouth-Brunswick Sequence**

- Oma — Mount Ararat Formation: Plagioclase-quartz-biotite schist, amphibolite, and minor impure marble.
- Onp — Nehumkeag Pond Formation: Light gray, plagioclase-quartz-biotite gneiss with minor amphibolite.
  - Onpa — Amphibolite.

**Merrimack Group**

- SOe — Eliot Formation: Thin-bedded, bluish-gray quartz-plagioclase-biotite granofels, biotitic phyllite, and calc-silicate granofels.
- SOk — Kittery Formation: Buff-weathering, thick-bedded quartz-rich ankeritic granofels and chlorite-biotite phyllite.

**Casco Bay Group**

- Ospj — Spring Point to Jewell Formations, undifferentiated.
- Oj — Jewell Formation: Light gray to dark gray muscovite-biotite-garnet phyllite to schist, locally carbonaceous or rusty-weathering. (Lithologically like the Scarboro Formation.)
  - Ojf — Brownish-gray, chalky-weathering, quartz-biotite phyllite.
- Osk — Spurwink Metalimestone: Fine-grained, metamorphosed limestone with thin interbeds of calcareous biotite-quartz phyllite. Contorted.
- Osc — Scarboro Formation: Light gray to dark gray muscovite-biotite-garnet phyllite to schist, locally carbonaceous or rusty-weathering. (Lithologically like the Jewell Formation.)
  - Oscl — Thin-bedded, fine-grained metamorphosed limestone and biotite phyllite.
  - Oscg — Greenish-gray quartz-plagioclase-chlorite-biotite-garnet phyllite.
- Odi — Diamond Island Formation: Black, rusty-weathering, quartz-muscovite-graphite-pyrite phyllite.
- Osp — Spring Point Formation: Greenish-gray plagioclase-quartz-biotite +/-chlorite +/-amphibole phyllite, schist, and gneiss representing metamorphosed volcanic tuffs and flows.
  - Ospf — Quartz-plagioclase +/-biotite +/-muscovite granofels.
  - Ospb — Dark gray amphibolite, locally containing garnet.
- Oce — Cape Elizabeth Formation: Thin-bedded quartz-pagioclase-biotite-muscovite schist and granofels.
  - Ocer — Rusty-weathering muscovite-biotite-garnet-staurolite schist and phyllite.
  - Ocee — Quartzose plagioclase-biotite phyllite with garnet-rich granofels (coticule) beds. (On western House Island, Casco Bay.)
- Oc — Cushing Formation: Medium-gray to light-gray, massive to thin-bedded, quartz-feldspar-biotite gneisses and subordinate schists representing metamorphosed pyroclastic volcanics and volcanogenic sediments. Includes varieties with garnet, hornblende, or relict blue quartz phenocryst fragments.
  - Ocr — Rusty-weathering, fine-grained, plagioclase-quartz-muscovite schist.
  - Ocw — Wilson Cove Member: Very sulfidic, rusty-weathering rocks, including garnet-biotite-amphibole gneiss and quartz-muscovite schist.
  - Ocl — Impure marble.
  - Oca — Amphibolite with minor calc-silicate gneiss and impure marble.
  - Ocm — Merepoint Member: Sulfidic quartz-plagioclase-muscovite-biotite schist.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## EXPLANATION OF SYMBOLS

**Mesozoic Intrusions**

- Basalt or diabase dike.

**Isolated Paleozoic Intrusions**

- \+ Pegmatite.
- ^ Aplite.
- x Muscovite-biotite granite.
- # Garnet-bearing granite.
- = Foliated biotite granite.

**Isolated Paleozoic Metamorphic Rock Occurrences**

- s Schist.
- c Calc-silicate rock.
- g Quartz-feldspar-biotite granofels.

## EXPLANATION OF PATTERNS

- Intrusive rock mixed with abundant metamorphic rock.
- Syenite with porphyritic texture.

## EXPLANATION OF LINES

- Approximate migmatite boundary. Separates moderately to strongly migmatitic rocks from weakly or non-migmatitic rocks; "m" toward the migmatitic side. Applies only to stratified rocks in the northeast part of the map. Migmatitic rocks to the west are not delineated separately.
- Intrusive or stratigraphic contact. Location inferred from nearest mapped bedrock exposures. Queried where not mapped.
- Fault, interpreted as a thrust fault. Offset inferred from deformed rock features, mainly ductile fabrics, or from apparently discordant structural or stratigraphic features. Probably of Paleozoic age.
- Fault, interpreted as a high-angle fault. Offset inferred from deformed rock features, mainly brittle fabrics, or from apparently discordant structural, metamorphic, or stratigraphic features. Of Paleozoic(?) to Mesozoic age.